

# Carpal tunnel syndrome in general practice (1987 and 2001): incidence and the role of occupational and non-occupational factors

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## ABSTRACT

### Background

Most studies on the incidence of the carpal tunnel syndrome and the relation of this disorder with occupation are population-based. In this study we present data from general practice.

### Aim

To compare incidence rates of carpal tunnel syndrome in 1987 with those in 2001, and to study the relationship between carpal tunnel syndrome and occupation.

### Design of study

Analysis of the data of the first and second Dutch National Survey of General Practice, conducted in 1987 and 2001, respectively.

### Setting

General practices in The Netherlands.

### Method

One hundred and three general practices in 1987 with 355 201 listed patients, and 96 practices with 364 998 listed patients in 2001, registered all patients who presented with a new episode of carpal tunnel syndrome. Patient and GP populations were representative for The Netherlands.

### Results

The crude incidence rate was 1.3 per 1000 (95% confidence interval [CI] = 1.0 to 1.5) in 1987, and 1.8 per 1000 (95% CI = 1.7 to 2.0) in 2001. In males it was 0.6 (95% CI = 0.5 to 0.7) and 0.9 (95% CI = 0.8 to 1.0) respectively; in females 1.9 (95% CI = 1.7 to 2.1) and 2.8 (95% CI = 2.6 to 3.1). At both study periods, peak incidence rate occurred in the 45–64-year age group: in 2001 this peak reached 4.8 per 1000 (95% CI = 4.1 to 5.4) for females and 1.6 (95% CI = 1.2 to 2.0) for males. Women who performed unskilled and semi-skilled work had 1.5 times greater risk of acquiring carpal tunnel syndrome than women with higher-skilled jobs ( $P < 0.001$ ). In men no relationship of this kind was found.

### Conclusion

In 2001 the crude incidence rate of carpal tunnel syndrome was 1.5 times higher than in 1987, but the difference was not statistically significant after subdividing by age and sex. In both years the female:male ratio was 3:1. Incidence rates were related to the job level of women, but not of men.

### Keywords

age distribution; carpal tunnel syndrome; epidemiology; incidence; occupational diseases.

## INTRODUCTION

Carpal tunnel syndrome is a common cause of pain in the hand, but there is no gold standard for its diagnosis. It is often thought to be increasing in incidence.<sup>1,2</sup> There are few studies that describe the incidence of carpal tunnel syndrome in general practice and their results are difficult to access<sup>3,4</sup> because they are hidden in morbidity tables.

Incidence rates from general practice are different from population-based studies because they represent those patients who experience so much discomfort that they decide to consult their GP; in population-based studies, patients with symptoms are actively sought.

Carpal tunnel syndrome has been linked to jobs with strenuous and rapid repetitive hand activity,<sup>5,6</sup> although Loslever and Ranaivosoa suggested that non-occupational factors may be more important than occupational factors.<sup>7</sup>

The aim of this study was to use data from Dutch National Surveys in 1987 and 2001 to fill this information gap, and to study the incidence of carpal tunnel syndrome in general practice in 1987 and 2001. The study also aimed to explore associations with age, sex, and occupational factors in general practice.

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## METHOD

### Design

Data were obtained from the first (1987) and second (2001) Dutch National Survey of General Practice (DNSGP-1, DNSGP-2 respectively).<sup>8,9</sup> In both studies, the population of patients and GPs were largely representative for The Netherlands. The design of these studies has been extensively described elsewhere.<sup>8,9</sup> In both surveys all morbidity presented to the GPs was coded according to the International Classification of Primary Care (ICPC).

In the DNSGP-1,<sup>8</sup> data from 355 201 persons were collected, from which 181 887 persons were aged between 25 to 64 years; in the DNSGP-2,<sup>9</sup> data from 364 998 patients were collected with 203 942 persons aged from 25 to 64 years.

### Measurements and analyses

Patients with carpal tunnel syndrome were defined according to the ICPC code N93 and the assignment of a 'new' episode by GPs. Incident episodes are the sum of 'first ever' and 'new' episodes (for example, previous episode in the other wrist). Each patient could contribute with only one incident episode during the study period.

### Occupational factors

The relationship between carpal tunnel syndrome and occupation was analysed according to age groups of 25–44 years and 45–64 years. Data about occupation were obtained by sending a questionnaire by mail to all listed patients. Occupational data were obtained from 118 208 patients (65% response rate) in 1987, and 127 466 patients (63% response rate) in 2001.

In 2001, occupations were coded according to the Occupational Classification 1992 (SBC92) of Statistics Netherlands (CBS). In 1987 a previous edition of the SBC92 was used. Two categories of labour were distinguished: unskilled and semi-skilled labour versus skilled labour and higher-skilled professions.

## How this fits in

The incidence of carpal tunnel syndrome is often thought to be increasing. This study examined general practice incidence at two time periods. The incidence of carpal tunnel syndrome was higher in females than males. This study found a female:male ratio of 3 to 1. There was no relationship between occupation and the incidence of carpal tunnel syndrome in males; however, a relationship was identified for females. Women in unskilled job categories were found to be at higher risk of having carpal tunnel syndrome.

### Analyses

For calculation of incidence rates, 95% upper and lower confidence intervals (CI) were used. Differences between 1987 and 2001 for the various sex and age groups were assessed using  $\chi^2$  tests (for categorical variables).

The association between carpal tunnel syndrome and occupation was analysed for both sexes separately, with logistic regression adjusted for age.

## RESULTS

### Incidence rates of carpal tunnel syndrome

In 2001, 672 new cases occurred during the registration period of 1 year. In 1987, 113 new cases presented over a period of 3 months.

The crude incidence rate was 1.8 per 1000 in 2001 and 1.3 in 1987 (Table 1). When comparing the incidence rates of 2001 and 1987 by age and sex, differences were not statistically significant, although in most subgroups the rates in 2001 were higher than those in 1987. Incidence rates in females were more than three times higher than for males at both study periods ( $P < 0.001$ ). The highest incidence rate was found in the 45–64-year age group in 1987 and 2001. The distribution pattern across the age groups was roughly the same for both sexes.

### Carpal tunnel syndrome and occupational factors (25–64-year age group)

In neither 1987 nor 2001 was any association found between the skill level of work and incidence of carpal tunnel syndrome in males (Table 2). However, the incidence rate in females was higher among the unskilled/semi-skilled workers than among the

**Table 1. Incidence rates of carpal tunnel syndrome in 2001 and 1987 by sex and age.**

| Age, years | n   | 2001                        | n   | 1987                        | P-value |
|------------|-----|-----------------------------|-----|-----------------------------|---------|
|            |     | Incidence per 1000 (95% CI) |     | Incidence per 1000 (95% CI) |         |
| 15–24      | 15  | 0.3 (0.2 to 0.5)            | 5   | 0.3 (0.2 to 0.5)            | 0.999   |
| Male       | 2   | 0.1 (0.0 to 0.2)            | 2   | 0.3 (0.0 to 0.7)            | 0.495   |
| Female     | 13  | 0.6 (0.3 to 0.9)            | 3   | 0.4 (0.0 to 0.8)            | 0.819   |
| 25–44      | 247 | 2.1 (1.8 to 2.4)            | 54  | 1.9 (1.7 to 2.3)            | 0.920   |
| Male       | 54  | 0.9 (0.7 to 1.2)            | 14  | 1.0 (0.2 to 1.5)            | 0.929   |
| Female     | 193 | 3.3 (2.9 to 3.8)            | 40  | 2.7 (1.9 to 4.3)            | 0.529   |
| 45–64      | 288 | 3.1 (2.8 to 3.5)            | 34  | 2.0 (1.7 to 2.3)            | 0.411   |
| Male       | 75  | 1.6 (1.2 to 2.0)            | 7   | 0.8 (0.2 to 1.5)            | 0.242   |
| Female     | 213 | 4.8 (4.1 to 5.4)            | 27  | 3.1 (1.9 to 4.3)            | 0.109   |
| ≥65        | 123 | 2.6 (2.2 to 3.1)            | 20  | 1.9 (1.5 to 2.3)            | 0.759   |
| Male       | 30  | 1.5 (1.0 to 2.1)            | 3   | 0.7 (0.0 to 1.5)            | 0.394   |
| Female     | 93  | 3.4 (2.7 to 4.1)            | 17  | 2.7 (1.4 to 3.9)            | 0.657   |
| All        | 672 | 1.8 (1.7 to 2.0)            | 113 | 1.3 (1.0 to 1.5)            | 0.001   |
| Male       | 161 | 0.9 (0.8 to 1.0)            | 26  | 0.6 (0.4 to 0.9)            | 0.204   |
| Female     | 511 | 2.8 (2.6 to 3.1)            | 87  | 1.9 (1.5 to 2.3)            | 0.004   |

**Table 2. Association between incidence of carpal tunnel syndrome and work skill level (25–64-year age group).**

|        | Incidence per 1000 (95% CI) |                           |
|--------|-----------------------------|---------------------------|
|        | Un- and semi-skilled labour | Skilled labour and higher |
| 1987   |                             |                           |
| Male   | 0.9 (0.2 to 1.6)            | 1.0 (0.5 to 1.6)          |
| Female | 4.2 (2.3 to 5.8)            | 2.6 (1.5 to 3.8)          |
| 2001   |                             |                           |
| Male   | 1.4 (0.9 to 2.0)            | 1.4 (1.0 to 1.7)          |
| Female | 5.4 (4.4 to 6.4)            | 3.5 (2.9 to 4.1)          |

workers in higher-skilled jobs: 4.2 versus 2.6 in 1987 and 5.4 versus 3.5 in 2001 in the unskilled and higher-skilled jobs respectively ( $P = 0.001$ ).

The odds ratio (OR) adjusted for age in females was 1.5 (95% CI = 1.2 to 2.0,  $P = 0.001$ ) for unskilled and semi-skilled work when compared with work in higher job categories. For males the OR was 1.1 (95% CI = 0.7 to 1.6,  $P = 0.82$ ). This confirmed that occupational level is associated with the occurrence of carpal tunnel syndrome in women, but not in men.

## DISCUSSION

### Summary of main findings

The incidence rates found in this study are congruent with data from comparable settings in Britain. The incidence rate in the fourth National Morbidity Study,<sup>3</sup> conducted in 1990–1991, was 1.4 per 1000; in the Weekly Returns Service<sup>4</sup> in 2004 this was found to be 1.9 per 1000. The distribution across age groups and male:female ratios of these two studies were also similar to the current findings.

The incidence rate was higher in 2001, however, for separate sex and age groups the differences between 1987 and 2001 reached no significance due to small absolute numbers in 1987.

### Comparison with existing literature

In a general health mail survey followed by clinical examination in Sweden in 1997, Atroshi *et al*<sup>10</sup> found a prevalence rate of 3.8% in a sex- and age-stratified sample of 2466 responders aged 25–74 years. In 1985 de Krom *et al*<sup>11</sup> performed a study in The Netherlands to determine the prevalence of carpal tunnel syndrome in a general population. In an age- and sex-stratified survey of 715 participants (70% response rate) aged 25–74 years, the prevalence rate of undetected carpal tunnel syndrome was 5.8%.

Incidence and prevalence rates from general practice are more than 10 times lower than those of community-based studies. It appears that there is a

large proportion of people with carpal tunnel syndrome who do not present their symptoms to a GP. Assuming that patients will consult a doctor when symptoms are seriously affecting them, it is most likely that the prognosis is much better than suggested by studies from other settings,<sup>12,13</sup> as the symptoms of most cases subside spontaneously over time.

### Carpal tunnel syndrome and occupation

For women in unskilled and semi-skilled job categories, the risk of acquiring carpal tunnel syndrome was 1.5 times higher than for women grouped in the 'higher job' category. For men, no relationship was found between incidence and type of job. This sex difference was not identified in the literature.

Several reasons can be proposed to explain the difference between incident rates according to sex. In addition to their paid jobs, many women often perform the majority of hand-intensive work in the home. Another possibility is that the unskilled and semi-skilled jobs held by women may be more strenuous on the wrist than jobs that men hold in that category. A more detailed job analysis is required to provide a definitive answer.

### Strengths and limitations of the study

A limitation in exploring the link between carpal tunnel syndrome and occupation was that the study included no information regarding the types of hand activities involved in a specific job. Additionally, GPs' diagnoses had to be taken at face value. As 30% of the patients were referred, a specialist verified the diagnosis of those patients, but in all other cases the diagnosis could not be verified in other ways. The authors assumed that GPs' diagnoses of carpal tunnel syndrome were made only in cases where the syndrome was clearly indicated. Concordance with other primary care studies appears to be a confirmation of this premise.<sup>3,4</sup> Occupation was known for approximately 65% of the population. An analysis was performed on those whose occupation was not known which found more or less the same incidence rates as for those whose occupation was known.

A strength of the study is that information about the incidence of carpal tunnel syndrome is presented for a large population from general practice. The patient population and participating GPs were representative of the Dutch population as a whole and Dutch GPs respectively. Practice-based morbidity surveys disclose a different type of information than population-based surveys, because they have the added input of GP interpretation.

### Implications for future research

In general terms, an average of four to six new cases of carpal tunnel syndrome presented to GPs in 2001 in a normative practice of 2350 patients. This is much lower than incidence rates found in community-based studies and studies that rely on self-reporting. Overall, the contribution of occupational factors to the development of carpal tunnel syndrome seems limited. Taking into account that the risk of having carpal tunnel syndrome is 1.5 times higher for women in unskilled job categories than for their counterparts in skilled work, demanding job categories were responsible for only one or two extra cases in a group of 1000 working women. The previously unreported finding of higher incidence in females requires further investigation.

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### Ethics committee

The study was carried out according to Dutch legislation on privacy. The privacy regulation of the study was approved by the Dutch Data Protection Authority. According to Dutch legislation, obtaining informed consent is not obligatory for observational studies

### Competing interests

The authors have stated that there are none

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